NOTES FROM "TECHNICAL WORKSHOP ON ESTUARINE HABITAT IN THE BAY-DELTA ESTUARY"
SESSION #1, 2, &3
REPORTER: ROSENFIELD

Randy -- Description of the current X2 standard

- E:I Ratios (65%, etc) that change moving into late-winter/early spring to allow greater export
- Stepwise maintenance of X2 locations
- Number of days to exceed (i.e. be downstream of three trigger localities)
- February-June

Intended to benefit: starry flounder, LFS, striped bass, Pacific herring, *Crangon* sp and other species in the lower estuary

Lenny – When the X2 regulations were put in place, was it a "habitat volume/area" relationship or just a flow:abundance relationship?
[A: mainly the flow-abundance relationships with not so much focus on or understanding of the mechanism]

Jan – In early 1990's was arguing that increased productivity was related to positioning the X2 hab near shallow habitat

Jan – The species are different. So we can't expect one metric to represent one ecological function for the different species (though it may represent/index several ecological functions)

Chris – For a fish:
Job #1 is orienting towards the physiological optima
Job #2 is getting needs met (smaller scale processes) within that physical space

Jon – X2 provides an index of multiple functions for different fishes. Perhaps the current standard is the right tool, but its implementation is janky because it was thought of as controlling 1 variable of importance to ALL the fish, rather than multiple mechanisms that affect different fish differently

Ideas for upgrading the SWRCB approach:

Generated by	Idea	Discussion
Randy	Extend the salinity standard back a few months into Dec-Jan (need more basic research to understand the functional relationship between different life stages and outflow/X2 position → relates to how long? when? and where? do you need to set the relationship)	-RB concerned that LFS eggs are incubating starting in December and we may be missing a benefit by not protecting outflows during that period -Might not need to happen every year but in the critical years
Jon Michael	De-discretize the X2 "trigger" points (e.g. Roe island triggers). Make the "X2" requirement responsive to the continuous nature of the flow-abundance relationship (no trigger points and temporally more fine scale than 1 month increments)	-The tidal excursion in any given day is so great that it leads to questioning what the habitat really is
David Bruce	What about other indicators of flow → e,g, something to capture the temporal variability in flow (pulses may be really important regardless of where X2 is)	
Chris Josh	Link the regulations to the mechanisms to the greatest extent possible → this will drive increased focus on the mechanistic relationships In other words, improve the relationship between the X2 management and a more refined description of the mechanisms that are indexed by X2 and their relationship to species biology (a "transport" mechanism for fish "a", may produce a different X2 standard than a "food production" mechanism)	Jon Mechanisms are helpful for refining and optimizing regulation but they are NOT required. When the mechanism is lacking, the empirical relationship between flow or LSZ position and fish population response is more than sufficient to establish a regulation. BJ/Michael/Matt/Steven Work species-by-species to establish what drives species abundance. Any links between outflow/x2 can contribute to an aggregated outflow/x2 standard. Specific accounting of what you're trying to achieve with increased flows.

		ALSO, make sure that any potential X2 recommendation is clear as to the *uncertainty* associated with it
Bruce	Craft more than one set of standards (adaptive management: manage outflow for nutrients in one year and LSZ position (or something else) in another year)	-In the years of this a.m. regime that call for reduced exports, there is more storage south of Delta now than there was in 1995
Michael/Larry	Take a year-round approach (perhaps based on water-year type) so that consequences of spring outflow recs are not negatives to fall outflows	A more holistic standard (fall X2 that acknowledges upstream storage conditions)
Michael	Assumptions in the equations that relate X2 to other water quality conditions (e.g. stratification) can be improved (currently, very conservative for purposes of other water diverters)	
Michael	Doing an overall cost-benefit analysis of incremental changes in outflow should be required -- Water costs of Roe Island are high, have you achieved an acceptable marginal benefit for that water increment	
Steve M.	Direct measurement of X2 on a more continuous scale (or maybe try it for a few years to improve calibration of current interpolation)	
Matt	Have a multi-day intensive workshop to develop justification tieing each species' stressors to particular outflow/LSZ positions (e.g a multi-day symposium on question #1)	
Steve M.	Ask people the question: "*If you have ___ [limited] water to spend, how would you allocate the water*?"	
Randy	We need to think more explicitly about fish downstream, in the pelagic zone, that don't usually receive as much attention. (e.g. starry flounder and Pacific herring)	
Randy	LSZ habitat is not just the volume between two narrow salinity boundaries (e.g. ½ -6 p.s.u), instead, for some species, it should be measured from "where the lower boundary was" (e.g. the volume *up to* 6 psu)	

Scientific discoveries and modeling techniques since 1995 that should be applied toward managing LSZ?

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Chris	Integrate the biological research and the quant. modeling	→ would lead to the development of models to specifically address biological hypotheses
Lenny	Life cycle model	
Lenny	Turbidity Model	
Lenny	Sensor arrays	
Lenny	3-D Modeling of habitat	
Lenny	Bioenergetic Models	
Jan	Understanding of food web dynamics	
Jon	(Bone) Otolith microchemical techniques to determine natal habitat and retrospective life history analysis	
Dave/Jan	Can/should develop budgets for food plankton, turbidity etc. in order to define behavior of fish "habitat" in relationship to LSZ position -Currently can develop models that would predict when, where and how much phytoplankton growth occurs under different LSZ positioning scenarios (similar for turbidity movement) Parse out the effect of outflow temporally and spatially (when does outflow get you the most bang for the buck in terms of "food production", "turbidity overlap with critical life history needs of the species")	-In order to "optimize" water flow for production of certain key habitat features, we need a better understanding of what needs to be optimized (for each of the different species) --Need to address where, when, and how food is being *transported* into the various "habitats" (is it locally produced? is it advected in?). This is particularly critical for evaluating the food web impacts of wetland/floodplain restoration efforts
Chris	Now know much more about Suisun Marsh than we did in 1995	

BJ	Historical evidence reveals that the fish have declined since the X2 relationship was put in place → perhaps regulation of X2 for purposes of protecting these species is not warranted?	This could also be interpreted as a poorly designed and implemented regulation, rather than an incorrect metric or conceptual model. For example, the failure to trigger the Roe Island reqt in many years (achieved by "gaming" the regs and manipulating reservoir releases) and the discrete nature of the standard temporally and spatially (not recognizing the value of each increment of LSZ movement/outflow improvement) may have led to a failure of the regs to actually implement the conceptual model.
Bruce	There is more storage south of Delta now than there was in 1995	
Jon	We know that adaptive management is difficult to actually implement in this ecosystem if it involves water supply constraints (e.g. VAMP)	
Anke	We're better at building conceptual models and tying those to study plans and quantitative studies	